

AbstractID: 1779 Title: Image-Guidance and Dose Reconstruction for Retreat Cord Compressions using Helical Tomotherapy

The treatment of patients with previously irradiated cord compressions must combine accurate patient positioning with conformal dose delivery to minimize spinal cord dose. By combining daily image guidance with IMRT, it is possible to deliver a second course of therapy without exceeding the cord dose TD₅ tolerances of 50 to 55 Gy. Five patients with cord compressions that had received previous radiotherapy were treated on a HI-ART² Tomotherapy system with daily MVCT based image-guidance for a total of 55 fractions. MVCT images were taken twice prior to treatment and autofused with the treatment planning kVCT images. After the completion of treatment, dose distributions were reconstructed using the original treatment planning CT and incorporating the measured patient shifts. Treatment delivery would not be possible without image guidance due to an 86.4% (range 33 to 250%) increase in cord dose due to patient setup uncertainty. This increase was decreased to 5.2% (range 0 to 25%) by utilizing image-guidance. The measured dose gradient along the PTV/cord interface ranged from 5-10% per mm. This study indicates that helical tomotherapy is capable of delivering conformal doses with a high degree of accuracy using daily image-guidance. The Dose reconstruction analysis shows that the dose to the spinal cord can be kept below tolerance while delivering an addition 30 Gy to the PTV. To date, all patients responded to the treatment and none have developed acute or chronic complications.

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